



SEQUENCE LISTING

<110> Haygood, M.
Davidson, S.K.
Allen, S.W.
Hildebrand, M.

<120> Bryostatins, Bryopyrans and Polyketides: Compositions and Methods

<130> 1133.010US1

<140> US 09/775,938
<141> 2001-01-31

<150> PCT/US00/21326
<151> 2000-08-04

<150> US 60/147,283
<151> 1999-08-04

<160> 38

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<212> DNA
<213> Endobugula sertula

<220>
<221> misc_feature
<222> (1)...(17)
<223> N in this sequence refers to I or inosine.

<400> 1
acrtgngcrt tngtncc

17

<210> 2
<211> 15
<212> DNA
<213> Endobugula sertula

<220>
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<222> (1)...(15)
<223> N in this sequence refers to I or inosine.

<400> 2
ncayggnacn ggnac

15

<210> 3
<211> 18
<212> DNA
<213> Endobugula sertula

<400> 3
acggacaagc gtcattac

18

<210> 4		
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acggacaaggc gtcattac		18
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gttgtttttg cagcatcgca tgttaccac		29
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cacggcccgct atcccagcac ctacc		25
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tgctatttga tgagcccgcg tt		22
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<400> 8		
catcgctgct tcgcaaccc		19
<210> 9		
<211> 315		
<212> DNA		
<213> Endobugula sertula		
<400> 9		
aaattgggtg atccgataga agtcgagaca ttggcagaat cgtttcgagt ctatacggac		60
aagcgtcatt actgtgctct ggggtcggtt aaaagtaata ttggtcattt gggggtaggt		120
gctgggatag cgggcgtgac caaagtattt ttgtctttgc agcatcgcat gttaccaccc		180
acgatttcatt gtgaggatgt aaacccacag attgcgttgg aaggtagccc cttttatatc		240
aatacggaat taaaggcttg gcagtctggt gacggtatac cacgacgggc tgggtcgat		300
tcttttggtg tcagt		315
<210> 10		
<211> 105		
<212> PRT		
<213> Endobugula sertula		

<400> 10
 Lys Leu Gly Asp Pro Ile Glu Val Glu Thr Leu Ala Glu Ser Phe Arg
 1 5 10 15
 Val Tyr Thr Asp Lys Arg His Tyr Cys Ala Leu Gly Ser Val Lys Ser
 20 25 30
 Asn Ile Gly His Leu Gly Val Gly Ala Gly Ile Ala Gly Val Thr Lys
 35 40 45
 Val Leu Leu Ser Leu Gln His Arg Met Leu Pro Pro Thr Ile His Cys
 50 55 60
 Glu Asp Val Asn Pro Gln Ile Ala Leu Glu Gly Ser Pro Phe Tyr Ile
 65 70 75 80
 Asn Thr Glu Leu Lys Pro Trp Gln Ser Gly Asp Gly Ile Pro Arg Arg
 85 90 95
 Ala Gly Val Ser Ser Phe Gly Val Ser
 100 105

<210> 11
 <211> 736
 <212> DNA
 <213> Endobugula sertula

<400> 11
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 aagcgtcatt actgtgctct ggggtcggtt aaaagtaata ttggtcattt gggggtaggt 120
 gctgggatag cgggcgtgac caaagtattt ttgtctttgc agcatcgcat gttaccaccg 180
 acgattcatt gtgaggatgt aaacccacag attgcgttgg aaggttagccc cttttatatc 240
 aatacggaaat taaaggcttg gcagtctgtt gacgtatac cacgacgggc tgggtgcagt 300
 tcttttgggtg tcagtggtac caatgcacat cttgtatttag aagaatatac tcaccgagta 360
 acatcaccat tacaaaatac tattttaccc cagaacgggtt tgtttattgt tccactatct 420
 gcaaaaaatg atgaatgctt aatgcttgcgtt gtcgaacgac tggattttt tctaaaaagc 480
 aggcaatccg atacatataa aaaatattcc ttaagtgata cagctcctat attgttagat 540
 ttagcatata ccctccaggt cagtagggaa gcgtgacaa aacgagttgc cttttagtg 600
 aaaacaacaa tagagttaat ggaaaaattha aatgcattta tagaaaaaca aaatactata 660
 aaagcaagta atataaaagg ttgttactac tcttcgacta aaacatcgag tccatttgat 720
 aatgaatcga ctgatc 736

<210> 12
 <211> 245
 <212> PRT
 <213> Endobugula sertula

<400> 12
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 20 25 30
 Asn Ile Gly His Leu Gly Val Gly Ala Gly Ile Ala Gly Val Thr Lys
 35 40 45
 Val Leu Leu Ser Leu Gln His Arg Met Leu Pro Pro Thr Ile His Cys
 50 55 60
 Glu Asp Val Asn Pro Gln Ile Ala Leu Glu Gly Ser Pro Phe Tyr Ile
 65 70 75 80
 Asn Thr Glu Leu Lys Pro Trp Gln Ser Gly Asp Gly Ile Pro Arg Arg
 85 90 95
 Ala Gly Val Ser Ser Phe Gly Val Ser Gly Thr Asn Ala His Leu Val
 100 105 110
 Leu Glu Glu Tyr Thr His Arg Val Thr Ser Pro Leu Gln Asn Thr Ile
 115 120 125

Leu	Pro	Gln	Asn	Gly	Leu	Phe	Ile	Val	Pro	Leu	Ser	Ala	Lys	Asn	Asp
130					135						140				
Glu	Cys	Leu	Asn	Ala	Cys	Val	Glu	Arg	Leu	Leu	Phe	Phe	Leu	Lys	Ser
145					150					155				160	
Arg	Gln	Ser	Asp	Thr	Tyr	Lys	Lys	Tyr	Ser	Leu	Ser	Asp	Thr	Ala	Pro
				165				170				175			
Ile	Leu	Leu	Asp	Leu	Ala	Tyr	Thr	Leu	Gln	Val	Ser	Arg	Glu	Ala	Met
					180			185			190				
Thr	Lys	Arg	Val	Ala	Phe	Val	Val	Lys	Thr	Thr	Ile	Glu	Leu	Met	Glu
			195			200					205				
Lys	Leu	Asn	Ala	Phe	Ile	Glu	Lys	Gln	Asn	Thr	Ile	Lys	Ala	Ser	Asn
		210				215				220					
Ile	Lys	Gly	Cys	Tyr	Tyr	Ser	Ser	Thr	Lys	Thr	Ser	Ser	Pro	Phe	Asp
		225			230				235			240			
Asn	Glu	Ser	Thr	Asp											
		245													

<210> 13
<211> 312
<212> DNA
<213> Endobugula sertula

<400> 13															
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cggaaaacagt	tttgcggtat	cggttcagta	aaatcaaata	ttggtcatct	ggatgttgct										120
gctggagtcg	ttggctctgat	caagacagca	ttgtcgctgc	agcaccggtt	tttgccctccc										180
acgatcaact	acgaagcacc	caatcgggaa	atcaattttg	aacaatcacc	ctttcatgtg										240
attgatgaac	tcacggagtg	gcggggtcaa	ggtggaccac	ttcgtgctgg	tgtcagctcg										300
tttggaaatttg	gt														312

<210> 14
<211> 104
<212> PRT
<213> Endobugula sertula

<400> 14															
Arg	Leu	Gly	Asp	Pro	Ile	Glu	Leu	Ala	Ala	Leu	Ser	Lys	Ala	Phe	Glu
1				5				10			15				
Glu	Gly	Thr	Gln	Arg	Lys	Gln	Phe	Cys	Gly	Ile	Gly	Ser	Val	Lys	Ser
					20			25			30				
Asn	Ile	Gly	His	Leu	Asp	Val	Ala	Ala	Gly	Val	Val	Gly	Leu	Ile	Lys
					35			40			45				
Thr	Ala	Leu	Ser	Leu	Gln	His	Arg	Leu	Leu	Pro	Pro	Thr	Ile	Asn	Tyr
					50			55			60				
Glu	Ala	Pro	Asn	Arg	Glu	Ile	Asn	Phe	Glu	Gln	Ser	Pro	Phe	His	Val
					65			70			75			80	
Ile	Asp	Glu	Leu	Thr	Glu	Trp	Arg	Gly	Gln	Gly	Gly	Pro	Leu	Arg	Ala
					85			90			95				
Gly	Val	Ser	Ser	Phe	Gly	Ile	Gly								
				100											

<210> 15
<211> 324
<212> DNA
<213> Endobugula sertula

<400> 15															
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cgcaaaaaca cctgtgccct	cggctcggt	aaaagcaata	ttggccatac	ctctgcggcc	120
tctggtgtgg	ctggataca	caagggtctg	ttatcgctta	agcatcgaca	180
agcctgcatt	ttaatagcgc	caatcaccac	tttgattttc	aacagtcgccc	240
aatacccagc	taaggccctg	ggtcaagca	gaggactag	aagaaagccg	300
gcggtcagtt	cttttgtgt	cagt		ccggccggct	324

<210> 16
<211> 108
<212> PRT
<213> Endobugula sertula

<400> 16

Gln	Leu	Gly	Asp	Pro	Ile	Glu	Leu	Gln	Ala	Leu	Ala	Asp	Val	Tyr	Arg
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Val	Asp	Asn	Trp	Arg	Lys	Asn	Thr	Cys	Ala	Leu	Gly	Ser	Val	Lys	Ser
					20			25					30		
Asn	Ile	Gly	His	Thr	Ser	Ala	Ala	Ser	Gly	Val	Ala	Gly	Ile	His	Lys
	35					40						45			
Val	Leu	Leu	Ser	Leu	Lys	His	Arg	Gln	Leu	Val	Ala	Ser	Leu	His	Phe
	50					55						60			
Asn	Ser	Ala	Asn	His	His	Phe	Asp	Phe	Gln	Gln	Ser	Pro	Phe	Tyr	Val
65						70			75			80			
Asn	Thr	Gln	Leu	Arg	Pro	Trp	Asp	Gln	Ala	Glu	Gly	Leu	Glu	Glu	Ser
	85						90					95			
Arg	Arg	Arg	Ala	Ala	Val	Ser	Ser	Phe	Gly	Val	Ser				
					100						105				

<210> 17
<211> 308
<212> DNA
<213> Endobugula sertula

<400> 17

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cagaaaaatc	gtttgctgg	cgatcagta	aaagccaata	ttagtcacct	ggaagcagcc	120
gggggtattt	ctggactgat	caaagcagta	ctggcaatgc	agcatggcgt	gattccacag	180
caattacact	gcaaagaacc	gagtccctcat	atcccctgga	aacgtctgcc	tctcgatttg	240
gtacaagagc	agactgtctg	gccggaaagt	gaagagcga	tcgcggctgt	aacagcgtcg	300
gattagcg						308

<210> 18
<211> 101
<212> PRT
<213> Endobugula sertula

<400> 18

Glu	Tyr	Gly	Asp	Pro	Met	Glu	Leu	Thr	Ala	Ala	Ala	Val	Phe	Gly	
1					5			10				15			
Arg	Gly	Arg	Asn	Gln	Lys	Asn	Arg	Leu	Leu	Val	Gly	Ser	Val	Lys	Ala
					20			25				30			
Asn	Ile	Ser	His	Leu	Glu	Ala	Ala	Gly	Ile	Ser	Gly	Leu	Ile	Lys	
	35					40					45				
Ala	Val	Leu	Ala	Met	Gln	His	Gly	Val	Ile	Pro	Gln	Gln	Leu	His	Cys
	50					55					60				
Lys	Glu	Pro	Ser	Pro	His	Ile	Pro	Trp	Lys	Arg	Leu	Pro	Leu	Asp	Leu
65						70			75			80			
Val	Gln	Glu	Gln	Thr	Val	Trp	Pro	Glu	Ser	Glu	Glu	Arg	Ile	Ala	Ala
					85			90			95				

Val Thr Ala Ser Asp
100

<210> 19

<211> 300

<212> DNA

<213> Endobugula sertula

<400> 19

caacttggcg	atgaaataga	agttcgcgct	ctgagtaaag	tgtacggaga	ttcacagtcc	60
acgacatacc	ttggtgctgt	aaaaagcaac	ataggtcatg	ccaaacgcagg	agcgggcatt	120
gctgggttta	ttaaaacggt	gctgtctctt	taccatggca	aaattgcacc	caatgcaggc	180
aataccgagc	ccaatgcagc	tttgaacctt	gacgcgttcc	attttgcatt	acccaaaaact	240
ttgcttacat	ggccggagtg	tgtatgttcga	cggcgcagcga	tcagctcaact	gggttttgg	300

<210> 20

<211> 100

<212> PRT

<213> Endobugula sertula

<400> 20

Gln	Leu	Gly	Asp	Glu	Ile	Glu	Val	Arg	Ala	Leu	Ser	Lys	Val	Tyr	Gly
1				5				10					15		
Asp	Ser	Gln	Ser	Thr	Thr	Tyr	Leu	Gly	Ala	Val	Lys	Ser	Asn	Ile	Gly
				20				25					30		
His	Ala	Asn	Ala	Gly	Ala	Gly	Ile	Ala	Gly	Phe	Ile	Lys	Thr	Val	Leu
				35				40				45			
Ser	Leu	Tyr	His	Gly	Lys	Ile	Ala	Pro	Asn	Ala	Gly	Asn	Thr	Glu	Pro
					50			55				60			
Asn	Ala	Ala	Leu	Asn	Leu	Asp	Ala	Phe	His	Phe	Ala	Leu	Pro	Lys	Thr
65					70				75				80		
Leu	Leu	Thr	Trp	Pro	Glu	Cys	Asp	Val	Arg	Arg	Ala	Ala	Ile	Ser	Ser
					85				90				95		
Leu	Gly	Phe	Gly												
				100											

<210> 21

<211> 304

<212> DNA

<213> Endobugula sertula

<400> 21

gccttgggt	atcctattga	atttggcgca	atcaaggctg	tgtatggcc	tggtcggct	60
tctccgctgg	tgctcgggtc	acttaaatcg	aacatcgccc	atttgaaagc	gactgcaggt	120
gttgcagctc	tgattaaaggc	agttttgggt	cttcaacatg	gcgtggctcc	ggccaatttg	180
cactgtcaca	aattgaatcc	gcttctggat	atcgacggct	tcaatgttgc	gttcccgca	240
tctgagaccc	ccttgcacag	ctctctgcag	ctacttggcg	ggtatcagtt	cgttcgggtt	300
tgg						304

<210> 22

<211> 101

<212> PRT

<213> Endobugula sertula

<400> 22

Ala	Leu	Gly	Asp	Pro	Ile	Glu	Phe	Gly	Ala	Ile	Lys	Ala	Val	Tyr	Gly
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Pro Gly Arg Ser Ser Pro Leu Val Leu Gly Ala Leu Lys Ser Asn Ile
 20 25 30
 Gly His Leu Glu Ala Thr Ala Gly Val Ala Ala Leu Ile Lys Ala Val
 35 40 45
 Leu Val Leu Gln His Gly Val Ala Pro Ala Asn Leu His Cys His Lys
 50 55 60
 Leu Asn Pro Leu Leu Asp Ile Asp Gly Phe Asn Val Val Phe Pro Gln
 65 70 75 80
 Ser Glu Thr Pro Leu His Ser Ser Leu Gln Leu Leu Gly Gly Tyr Gln
 85 90 95
 Phe Val Arg Val Trp
 100

<210> 23
 <211> 314
 <212> DNA
 <213> Endobugula sertula

<400> 23
 acttgggtat cccttattgag gtgggggctc ttacagaatc atttcgatcc ctatacagaa 60
 aaaaaagaact actgtgcctc gggatcggtt aaaagcaata tcgggcacatct tttaaccgcg 120
 gccggagttat ctggagtagt caaagtgtt ctcgcattttga aacataaagca acttccacct 180
 tcctgtcattc tggtaaaat caatgagcat atcaaccttg aggacagttcc attttatatc 240
 aatacggcat taaagaaatg ggaagtatcg gaaggtgagg ctcgcaggc cgcagtgc 300
 tcgtttgggtt cagc 314

<210> 24
 <211> 103
 <212> PRT
 <213> Endobugula sertula

<220>
 <221> SITE
 <222> (1)...(103)
 <223> Xaa = Any Amino Acid

<400> 24
 Thr Trp Xaa Ser Leu Leu Arg Trp Gly Leu Leu Gln Asn His Phe Asp
 1 5 10 15
 Pro Tyr Thr Glu Lys Lys Asn Tyr Cys Ala Ser Gly Ser Val Lys Ser
 20 25 30
 Asn Ile Gly His Leu Thr Ala Ala Gly Val Ser Gly Val Val Lys Val
 35 40 45
 Leu Leu Ala Leu Lys His Lys Gln Leu Pro Pro Ser Cys His Leu Val
 50 55 60
 Lys Ile Asn Glu His Ile Asn Leu Glu Asp Ser Pro Phe Tyr Ile Asn
 65 70 75 80
 Thr Ala Leu Lys Lys Trp Glu Val Ser Glu Gly Glu Ala Arg Arg Ala
 85 90 95
 Ala Val Ser Ser Phe Gly Ser
 100

<210> 25
 <211> 306
 <212> DNA
 <213> Endobugula sertula

<400> 25
ccactcggcg acccaatcga gatggcagca ttaaaacagg cttttggac tcaaaagaaa 60
aaatactgtg cgataagggtc ggtgaagagc aacattggtc atgcccatac ggccgctggc 120
gtcgctggtc tcatcaagac ggtgatggca ctcaaggcgc gtcagatacc gcctagcttg 180
cactttgaga ccccaatcc gcagatcgat tttggcgaca gtcacatata tgtaaataca 240
accttggaaag attggAACAC caacgggttt ccggccgcg cgccgtgag ttcgtttggc 300
atcggt 306

<210> 26
<211> 102
<212> PRT
<213> Endobugula sertula

<400> 26
Pro Leu Gly Asp Pro Ile Glu Met Ala Ala Leu Lys Gln Ala Phe Gly
1 5 10 15
Thr Gln Lys Lys Lys Tyr Cys Ala Ile Gly Ser Val Lys Ser Asn Ile
20 25 30
Gly His Ala Asp Thr Ala Ala Gly Val Ala Gly Leu Ile Lys Thr Val
35 40 45
Met Ala Leu Lys Ala Arg Gln Ile Pro Pro Ser Leu His Phe Glu Thr
50 55 60
Pro Asn Pro Gln Ile Asp Phe Ala Asp Ser Pro Phe Tyr Val Asn Thr
65 70 75 80
Thr Leu Lys Asp Trp Asn Thr Asn Gly Val Pro Arg Arg Ala Gly Val
85 90 95
Ser Ser Phe Gly Ile Gly
100

<210> 27
<211> 309
<212> DNA
<213> Endobugula sertula

<400> 27
gtggcggag atccgattga ggtcgtggga ctgacgaaag cctatcaagc gcacactcag 60
gaacgtcaat actgcggact gggttcgggt aagacgaata ttggccatac ggactcggct 120
gttggcattt ctggacttct caagatcgtc atggcgatga agcatcgtca actgcccgg 180
agcttgaatt ttgaaacacc aaatccagac ctggatctgg agaatagtc gtttccatc 240
cagacgaagc tgaaggattg ggaaagtgtg gggctcgtc gtggcggtt gagttcggtt 300
ggtttgggt 309

<210> 28
<211> 103
<212> PRT
<213> Endobugula sertula

<400> 28
Val Val Gly Asp Pro Ile Glu Val Val Gly Leu Thr Lys Ala Tyr Gln
1 5 10 15
Ala His Thr Gln Glu Arg Gln Tyr Cys Gly Leu Gly Ser Val Lys Thr
20 25 30
Asn Ile Gly His Thr Asp Ser Ala Ala Gly Ile Ala Gly Leu Leu Lys
35 40 45
Ile Val Met Ala Met Lys His Arg Gln Leu Pro Pro Ser Leu Asn Phe
50 55 60
Glu Thr Pro Asn Pro Asp Leu Asp Leu Glu Asn Ser Pro Phe Phe Ile
65 70 75 80

Gln Thr Lys Leu Lys Asp Trp Glu Ser Val Gly Pro Arg Arg Ala Ala
 85 90 95
 Leu Ser Ser Phe Gly Leu Gly
 100

<210> 29
 <211> 6000
 <212> DNA
 <213> Endobugula sertula

<220>
 <221> misc_feature
 <222> (386)...(388)
 <223> TAG may represent a transposase open reading frame.

<221> misc_feature
 <222> (444)...(449)
 <223> TTGAAA may be a possible -35 transcription control sequence.

<221> misc_feature
 <222> (458)...(463)
 <223> GATAAT may be a possible -10 transcription control sequence.

<221> misc_feature
 <222> (474)...(502)
 <223> ATCAATAAAAA and TTTTTATTGAT are inverted repeats.

<221> misc_feature
 <222> (576)...(583)
 <223> TGAGGAAT may be a possible SD sequence.

<221> misc_feature
 <222> (565)...(567)
 <223> ATG encoding M is presumptive start of PKS Open reading frame.

<221> misc_feature
 <222> (589)...(591)
 <223> GTG encoding V is is possible alternative start of PKS Open reading frame.

<400> 29
 gatggaaactc attaccaccc acaaaaaaagt ccgtttcttc aacgcgggtt atttaattaa 60
 ccagctaattc aacgaacaac aaaagcagca aacgggcaaa ctcatcagag ccttattgca 120
 ggtggattgt ttaagtattt atgaactcgg ttatataccca ttcccttaat ccgtggggc 180
 gttgtcttc cacccatca gtaaacggta tgagaagacc agtattatca tcagcaccaa 240
 tctggctttt gggaatgga acagtgtgtt tggtgatgcc aagatgacca ccgcgttatt 300
 ggatcgtatc acgcatcatt gttcaatcat cgaaaccaag catgcgtcgt atcgttttaa 360
 gcagagtcag aaacagacat gaaagttagt ttcaccgggtt ggacagtgtt agatgaaac 420
 cccgggtcag cttaagtgc aatttgaaaa ccaatgtgat aattgtggct aagatcaata 480
 aaaataaaaat ttttttattt attatgtatca tccacgtttaa aaaaaataact ataaatatga 540
 aataatattt caactttattt tttgtatggc gttgttgagg aattttttgt gagttatcga 600
 gatattttga aggcttaca ggtgaaaaa attagtttg aagaggctaa atataagtta 660
 ataaaaagaaa aagataaaaaa atcaaaaacag cgttaaatc atgatcgtga attaaatcga 720
 tcgatgaata ttacgccaat aatagtgaat aattacgggtt tagtattattt gggcggtcat 780

ttatggaa	aactccgtct	gagtgaatgg	aaagctgcca	accctaacc	taatgaagtt	840
agcattcagg	tcaaggcattc	cgccattagt	tttaccgata	ccttgtgtgt	acaagggtta	900
tatccatcac	actatccctt	tgccgggc	tttgaagtt	cgggagtgtat	tcgtcaagt	960
ggtaacaca	taaccgactt	acacgtgggt	gatgaagtt	ttgcgttcac	aggatcatca	1020
atgggagggc	atgctgccta	tgtgacgggt	ccacaagatt	acgtggtacg	aaaacccaag	1080
gacttatctt	ttgagatgc	ctgtagctc	ccatggctt	ttgcgaccgt	ctatcacagt	1140
tttgacggg	gaaaattatc	tcacaacgt	catacttga	tacaaaacggc	gacaggtggc	1200
tgtggttga	tggcaattca	gttggcgcgt	ttaaagcagt	gtgtgttta	tggacacctcc	1260
agccgagaag	acaagcttgc	actcctcaaa	cagtgggcac	tgcctacgt	cttcaattat	1320
aagacgtgca	atattgatga	ggagattcaa	cgcgtcagt	gtcatcgagg	tgtcgatgtc	1380
gtcttaata	tgctcccagg	agagcatata	caacaaggc	tgaatagttt	agccaaggga	1440
ggccgttatt	tggaactgtc	gatgcatgga	ttgttaacga	acgaacctgt	cagtctgtcg	1500
tctctgcgtt	ttaatcaatc	cgttcaacc	atcaatttac	tggggttact	caataagggt	1560
gatgatggct	ttatcgggtc	tgtttagcg	caaatggtt	cctggatga	atcaggtgat	1620
ttagtgtcaa	ccgtgtcg	tatttatccg	ttggatcaga	tcggtgaagc	gttacgttat	1680
gtctctgaag	gggagcatat	aggttaaagtc	gttggagtc	atacagcgac	agagccgatg	1740
gattgcagac	agcgctgtat	tgacaatgta	ttgaagcaag	ggcaaatggc	ggccttgacc	1800
gocacagggg	gaaaaagccg	ggtgtgggt	ggtactggt	tcaatgacaa	accgtctcct	1860
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kttwttcatt gccccgcctg gaatgtaaa ggaatggat tgaatggact ggaatgagaa
cgtgaaamca ragttctwty ttaagtccaa gcgggcaasg tctattggac ataaaggaag
gttggaggt tattgaacac attrctggct caggattatt ytcagtgtcy tawattggst
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<212> DNA
<213> Endobugula sertula

<220>
<221> misc_feature
<222> (1)...(4744)
<223> N refers to any nucleotide.

<400> 32

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cagcggacga	aagaaataaa	atatctatgt	atttataga	gttttttaat	ttctctatga	480
gtcgcttattt	agaaaatatg	gaaaggcatg	gattaaaaaa	atggatagat	caatccggag	540
ataactgggg	tatttcaa	cctgtattaa	ccgatttttt	ggatgggtt	ttaattattc	600
ccttattact	agaactgaag	gaaaatgggtt	attttgc	gttaaaaaaat	gkwaatagtc	660
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actatttaa	acaaaagaac	tggttccaag	aagaattraag	agacgtttt	cttcacaaaaa	780
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tntcaaaatc	ngggaatgta	aacctttna	tccaccgccc	gttggtttn	tncctgggna	4620
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tnng						4744

<210> 33
 <211> 1954
 <212> DNA
 <213> Endobugula sertula

<220>
 <221> misc_feature
 <222> (1)...(1954)
 <223> N refers to any nucleotide.

<400> 33						
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aatcwataca	aaaaawattg	awagatttt	kggkkgacat	tactaacttt	ttsgaggcn	180
agacatcmat	ccmrgcmgga	tgcctggta	ctatggtgkt	gattccatta	ttaggtatga	240
gattttaa	tcgaattaac	cyccacctt	aaawatagaag	ctgatgctt	attactaaca	300
gaaggaacga	ttmacca	gttatctt	arkwcm	tttattgtt	ataaaaaaaa	360
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taaagcattt	aatcatttgg	ttaacacata	ttcaattttc	agaacaaaag	caatgtt	840
caataagcaa	tggattcagg	taatacatga	tggttatca	gtaagatgcg	aaganaatta	900

yatacgaagg	attatctgca	ggaaaaaagat	tttacgcaac	aactaatnag	tatttcaaaa	960
agagcaaggt	aaaaaattat	ttgatatcga	taatctgcct	ttattaaaaa	tttattttat	1020
ccataatggt	aaagacttag	cagctatttt	tgttcatgcg	catcatttt	gtgccatgg	1080
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gatgcgaata	ataccacact	gacgcaattt	ctatgttgc	ctgttgcata	tttactgtat	1440
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caaaagcatt	ttctcttattc	cnngatggta	cctttttaa	gttattggaa	aaangggaaa	1620
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ccctcaanaa	aaaaaaaatt	tnttccaaa	aaaaaaaggg	gccccttaaa	ntccccattt	1740
agggatattt	ttaaattttt	taatttcccg	gnnaaaattt	tttntttaaa	ttccggaaatt	1800
aaggccnaan	tggatttaat	tggnaaaattt	tccantttgg	ttttttaaaa	agggggaaaaaa	1860
ncccnnaat	ttgggttcc	ttaaaaanaa	aaaaaagggg	gngggccccc	cggtgggttc	1920
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<210> 34
 <211> 2672
 <212> DNA
 <213> Endobugula sertula

<220>
 <221> misc_feature
 <222> (1)...(2672)
 <223> N refers to any nucleotide.

<400> 34						
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naaggcttca	agggcatcg	tcaaggaacc	tttcggcggg	cttttgcgt	gcgacaggct	180
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acgaatgttc	tgtatgcgt	gttttccgt	ggcgcgttgc	tgtctggta	tctgccttct	300
aaatctggca	cagccgaatt	gchgagcgtt	ggtttgctg	aaaccagaca	cacagcaact	360
gaataccaga	aagaaatca	ctttacctt	ctgacatcag	aaggcgagaa	atttgcgtt	420
gaacacctgg	tcaatacgcg	ttttggtgag	cagaatatt	gchgcttcgt	gacgcttggc	480
gtttagattt	atacctctgc	tgcacaaaag	gcaatcgc	agctgsrcym	scrmaktygk	540
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gswwwtggwr	ctawccacgm	arcssmwwt	gaaamaccks	rkyggntkw	csrawawmwa	660
cmrsmycasc	cttggwawmm	armrwsmtga	sywgckcw	aamaakgtwa	ccstcrkgkc	720
cgmtwgk	awkttwmac	cysrwrwwrr	ymcmaamatt	garrcsttgm	ycgraaccsc	780
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cggggcggc	acctcgnccg	gttttcgcta	tttatgaaaa	tttccgggtt	taaggcggtt	1080
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acgacagggt	ctgaaagcga	gcttttggc	ctctgtcg	tccttctct	gtttttgtcc	1200
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cacgaactgc	tgagcagttg	cggcaaattt	ccagtagatt	gctggcattt	attgaaaaga	1980
acaaggcaaga	cagcgtgg	accccccattaa	tagatattgc	ttatacattt	cagtagggac	2040
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attttgggg	gnaatgggtt	ttattggnaa	cccattccna	aaaccaaaaa	nggcctttt	2580
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acccnaangg	ggaaaaattt	tttttaaaaa	aa			2672

<210> 35
 <211> 2132
 <212> DNA
 <213> Endobugula sertula

<220>
 <221> misc_feature
 <222> (1)...(2132)
 <223> N refers to any nucleotide.

<400> 35						
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aaccttccc	aaaaaaagg	naantgaan	tgggggnan	cntggaaat	cccaagccaa	180
aaaaaggccc	aaymtcgccc	waraacrkc	cawwaatsss	gawaasmcyy	ccagawarwa	240
ttkwtkrwa	mwrawcyagy	wwmscamatc	rgrtgttwta	tggrrsssr	wmyawwtraa	300
aarymytcca	wyktktkss	grrtcaatka	tgssrkwtyy	tcaaymttgg	gactcmcyym	360
tcmmmwttt	aaaaaccmyw	attatakktr	taagsggcc	aaataatcaa	tgtggatat	420
ggtaamccg	ataaaaaaaa	gcctcaataa	attttntgc	caacaactaa	gacagctcta	480
caataaacat	aaaagcaata	atgagtccct	gtgattattt	cccatgaaaa	aaacaatggc	540
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gttaaagaaa	ttccctataa	ccggcttgg	gatattgata	attacttga	tacttcttcg	720
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<211> 2169

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<213> *Endobugula sertula*

<220>

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<223> N refers to any nucleotide.

<400> 36

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<210> 37
<211> 8380
<212> DNA
<213> Endobugula sertula

<220>
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<223> N refers to any nucleotide.

<400> 37

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<210> 38
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 <213> Endobugula sertula

<220>
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 Glu Leu Asn Arg Ser Met Asn Ile Thr Pro Lys Ile Val Asn Asn Tyr
 50 55 60
 Gly Leu Val Leu Leu Gly Gly His Leu Phe Glu Glu Leu Arg Leu Ser
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Gln	Cys	Val	Cys	Tyr	Gly	Thr	Ser	Ser	Arg	Glu	Asp	Lys	Leu	Ala	Leu
	225				230				235					240	
Leu	Lys	Gln	Trp	Ala	Leu	Pro	Tyr	Val	Phe	Asn	Tyr	Lys	Thr	Cys	Asn
				245				250					255		
Ile	Asp	Glu	Glu	Ile	Gln	Arg	Val	Ser	Gly	His	Arg	Gly	Val	Asp	Val
		260					265						270		
Val	Leu	Asn	Met	Leu	Pro	Gly	Glu	His	Ile	Gln	Gln	Gly	Leu	Asn	Ser
		275					280					285			
Leu	Ala	Lys	Gly	Gly	Arg	Tyr	Leu	Glu	Leu	Ser	Met	His	Gly	Leu	Leu
		290				295						300			
Thr	Asn	Glu	Pro	Val	Ser	Leu	Ser	Ser	Leu	Arg	Phe	Asn	Gln	Ser	Val
	305				310				315					320	
Gln	Thr	Ile	Asn	Leu	Leu	Gly	Leu	Leu	Asn	Lys	Gly	Asp	Asp	Gly	Phe
				325				330					335		
Ile	Gly	Ser	Val	Leu	Ala	Gln	Met	Val	Ser	Trp	Ile	Glu	Ser	Gly	Asp
		340					345						350		
Leu	Val	Ser	Thr	Val	Ser	Arg	Ile	Tyr	Pro	Leu	Asp	Gln	Ile	Gly	Glu
		355					360					365			
Ala	Leu	Arg	Tyr	Val	Ser	Glu	Gly	Glu	His	Ile	Gly	Lys	Val	Val	Val
		370				375						380			
Ser	His	Thr	Ala	Thr	Glu	Pro	Met	Asp	Cys	Arg	Gln	Arg	Cys	Ile	Asp
	385				390				395					400	
Asn	Val	Leu	Lys	Gln	Gly	Gln	Met	Ala	Ala	Leu	Thr	Ala	Thr	Gly	Gly
			405					410					415		
Lys	Ser	Arg	Val	Trp	Gly	Gly	Thr	Gly	Val	Asn	Asp	Lys	Pro	Ser	Pro
		420					425						430		
Ala	Val	Gly	Ile	Glu	Glu	Arg	Leu	Leu	Glu	Gly	Ile	Ala	Val	Ile	Gly
		435					440					445			
Leu	Ser	Gly	Gln	Tyr	Pro	Lys	Ser	Lys	Thr	Leu	Glu	Gln	Phe	Trp	Gln
		450				455						460			
Thr	Leu	Ala	Asp	Gly	Val	Asp	Cys	Ile	Ser	Glu	Ile	Pro	Ala	Asp	Arg
	465				470				475					480	
Trp	Ser	Leu	Glu	Glu	Tyr	Tyr	Ser	Pro	Ile	Pro	Glu	Gly	Gly	Thr	
			485					490					495		
Tyr	Cys	Lys	Trp	Met	Gly	Val	Leu	Glu	Asp	Met	Asp	Cys	Phe	Asp	Pro
			500				505						510		
Leu	Phe	Phe	Ala	Ile	Ser	Pro	Arg	Glu	Ala	Glu	Val	Met	Asp	Pro	Gln
			515				520					525			
Gln	Arg	Leu	Phe	Leu	Glu	Asn	Ala	Trp	Ser	Cys	Ile	Glu	Asp	Ala	Gly
		530				535						540			

Ile Asn Pro Lys Met Leu Ser Arg Ser Arg Cys Gly Val Phe Val Gly
 545 550 555 560
 Cys Gly Ala Asn Asp Tyr Ser Ala Leu Met Asn Ser Ser His Ser Thr
 565 570 575
 Ser Leu Glu Leu Met Lys Glu Leu Gly Asn Asn Ser Ser Ile Leu Ser
 580 585 590
 Ala Arg Ile Ser Tyr Phe Leu Asn Leu Lys Gly Pro Cys Leu Ala Ile
 595 600 605
 Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Ile Ala Glu Ser Cys Asn
 610 615 620
 Ser Leu Val Leu Gly Thr Ser Asp Leu Ala Leu Ala Gly Gly Val Leu
 625 630 635 640
 Leu Met Pro Gly Pro Ser Leu His Ile Gly Leu Ser His Gly Glu Met
 645 650 655
 Leu Ser Val Asp Gly Arg Cys Phe Thr Phe Asp Gln Arg Ala Asn Gly
 660 665 670
 Phe Val Pro Gly Glu Gly Val Gly Val Val Leu Leu Lys Arg Met Ser
 675 680 685
 Asp Ala Val Arg Asp Gly Asp Pro Ile Arg Ala Val Ile Arg Gly Trp
 690 695 700
 Gly Val Asn Gln Asp Gly Arg Ser Asn Gly Ile Thr Ala Pro Ser Ser
 705 710 715 720
 Lys Ala Gln Ser Ala Leu Glu Gln Glu Val Tyr Gln Arg Phe Asn Ile
 725 730 735
 Asp Pro Ser Ser Ile Thr Leu Val Glu Ala His Gly Thr Gly Thr Lys
 740 745 750
 Leu Gly Asp Pro Ile Glu Val Glu Ala Leu Ala Glu Ser Phe Arg Val
 755 760 765
 Tyr Thr Asp Lys Arg His Tyr Cys Ala Leu Gly Ser Val Lys Ser Asn
 770 775 780
 Ile Gly His Leu Gly Val Gly Ala Gly Ile Ala Gly Val Thr Lys Val
 785 790 795 800
 Leu Leu Ser Leu Gln His Arg Met Leu Pro Pro Thr Ile His Cys Glu
 805 810 815
 Asp Val Asn Pro Gln Ile Ala Leu Glu Gly Ser Pro Phe Tyr Ile Asn
 820 825 830
 Thr Glu Leu Lys Pro Trp Gln Ser Gly Asp Ser Ile Pro Arg Arg Ala
 835 840 845
 Gly Val Ser Ser Phe Gly Phe Ser Gly Thr Asn Ala His Leu Val Leu
 850 855 860
 Glu Glu Tyr Leu Pro His Ser Thr Gly Thr Ile Glu Ser Phe Ala Ala
 865 870 875 880
 Asn His Ala Ser Thr Val Ile Ile Pro Leu Ser Ala Lys Ser His Asn
 885 890 895
 Ser Leu Tyr Thr Tyr Ala Gln Thr Leu Leu Ile Phe Leu Lys Arg Ser
 900 905 910
 Gln Val Thr Asp Ala Lys Lys Ile Thr Ile Asp His Met Glu Cys Arg
 915 920 925
 Leu Leu Asp Leu Ala Tyr Thr Leu Gln Val Gly Arg Glu Ala Met Asp
 930 935 940
 Lys Arg Ile Ser Phe Ile Val Asn Thr Lys Gln Ala Leu Val Glu Lys
 945 950 955 960
 Leu Asn Ala Phe Leu Glu Lys Glu Lys Thr Ile Thr Asp Cys Tyr His
 965 970 975
 Tyr Leu Phe Asp Ser Asp Lys Pro Ser Thr Glu Ile Phe Arg Leu Asp
 980 985 990
 Glu Asp Asp Lys Val Leu Ile Asn Ser Trp Ile Ser Gln Ser Gln Tyr
 995 1000 1005

His Lys Leu Ala Glu Ala Trp Ser Gln Gly Leu Asp Ile Asp Trp Thr
 1010 1015 1020
 Leu Leu Tyr Thr His Ser Ser Thr Pro Arg Arg Ile Ser Leu Pro Thr
 1025 1030 1035 1040
 Tyr Pro Phe Ala Arg Asp Arg Tyr Trp Leu Pro Glu Lys Pro Arg Tyr
 1045 1050 1055
 Asn Ala Ala Asn His Pro Val Ser Asn His Gln Thr Thr Gln Asn
 1060 1065 1070
 His Ser Arg Phe Ala Ile Asp Thr Asp His Asp Val Val Ala Glu Ile
 1075 1080 1085
 Met Gln Lys Thr His Gln Gln Glu Leu Glu Gln Trp Leu Leu Lys Leu
 1090 1095 1100
 Leu Phe Val Gln Leu Gln His Met Gly Leu Phe Gln His Arg Val Phe
 1105 1110 1115 1120
 Glu Thr Ala Thr Ala Leu Arg Gln Ser Ala Gly Ile Val Asp Lys Tyr
 1125 1130 1135
 Asp Arg Trp Trp His Glu Cys Leu Ser Val Leu Gln Asp Ala Gly Tyr
 1140 1145 1150
 Leu Glu Trp Lys Asp Asp Ser Val Ala Ala Gln Ala Leu Glu Ser
 1155 1160 1165
 Glu Ser Gln Glu Ala Trp Trp Ser Arg Trp Asn Thr Glu Tyr Lys His
 1170 1175 1180
 Tyr Gln Asn Asp Pro Glu Lys Lys Thr Leu Ala Ile Leu Ile Asn Asp
 1185 1190 1195 1200
 Cys Leu Gln Ala Leu Pro Gly Val Leu Ser Gly Glu Gln Leu Ile Thr
 1205 1210 1215
 Asp Ile Ile Phe Pro Asn Gly Ser Met Glu Lys Met Glu Gly Leu Tyr
 1220 1225 1230
 Lys Asn Asn Arg Ile Ala Asp Tyr Cys Asn Gln Cys Val Gly Asp Leu
 1235 1240 1245
 Leu Val Gln Phe Ile Glu Ala Arg Leu Ser Arg Asp Ala Asn Ala Arg
 1250 1255 1260
 Ile Arg Ile Ile Glu Ile Gly Ala Gly Thr Gly Gly Thr Thr Ala Ile
 1265 1270 1275 1280
 Val Leu Pro Met Leu Gln Ala Tyr Gln Asp His Ile Asp Thr Tyr Cys
 1285 1290 1295
 Tyr Thr Asp Val Ser Lys Ala Phe Leu Met His Gly Gln Glu His Tyr
 1300 1305 1310
 Gly Glu Gln Tyr Pro Tyr Leu Ser Tyr Cys Leu Cys Asn Ile Glu Gln
 1315 1320 1325
 Asp Leu Val Ala Gln Gly Ile Ser Val Gly Asp Tyr Asp Ile Ala Ile
 1330 1335 1340
 Ala Ala Asn Val Leu His Ala Thr Arg Asn Ile His Glu Thr Val Ser
 1345 1350 1355 1360
 His Val Arg Gln Ala Leu Ala Ala Asn Gly Leu Leu Ile Leu Asn Glu
 1365 1370 1375
 Phe Ser Gln Lys Ser Val Phe Ser Ser Val Ile Phe Gly Leu Ile Asp
 1380 1385 1390
 Gly Trp Ala Leu Ser Glu Asp Thr Gly Leu Arg Ile Pro Gly Ser Pro
 1395 1400 1405
 Gly Leu Tyr Pro Lys Gln Trp Gln Ala Val Leu Glu Ala Ser Gly Phe
 1410 1415 1420
 Gly Asp Val Glu Phe Pro Leu His Asp Ala Arg Glu Leu Gly Gln Gln
 1425 1430 1435 1440
 Ile Ile Leu Ala Thr Asn Ala His Ala Asn Val Ala Ser Asp Leu Ala
 1445 1450 1455
 Thr Ser Val Ile Asp His Ala Pro Lys Arg Leu Pro Ser Ala Glu Val
 1460 1465 1470

Ser Met Asp Glu Arg Val Ser His Asp Ala Met Met Lys Ala Ser Val
1475 1480 1485
Lys Gln Leu Leu Val Glu Gln Leu Ser Gln Ser Leu Lys Leu Asp Met
1490 1495 1500
Asn Glu Ile His Pro Asp Glu Ser Phe Ala Asp Tyr Gly Val Asp Ser
1505 1510 1515 1520
Ile Thr Gly Ala Ser Phe Ile Gln Gln Leu Asn Asp Thr Leu Thr Leu
1525 1530 1535
Thr Leu Lys Thr Val Cys Leu Phe Asp His Ser Ser Val Asn Arg Leu
1540 1545 1550
Thr Ala Tyr Leu Leu Ser Asp Tyr Gly Asp Asp Ile Ala Gln Trp Leu
1555 1560 1565
Ala Thr Ala Pro Ala Leu Val Asp His Pro Gln Ser Val Val Ser Gln
1570 1575 1580
Val Leu Pro Glu Arg Ser Pro Ala Ser Thr Gln Ala Lys Pro Leu Pro
1585 1590 1595 1600
Ser Val Pro Pro Ser Leu Ser Met Glu Ser Pro Val Gln Gln Glu Ser
1605 1610 1615
Ile Ala Ile Ile Gly Met Ser Gly Arg Phe Ala Ala Ser Glu Asn Leu
1620 1625 1630
Glu Ala Phe Trp Gln Gln Leu Ala Gln Gly Val Asp Leu Val Glu Pro
1635 1640 1645
Ala Ser Arg Trp Gly Pro Gln Ala Glu Thr Tyr Gly Ser Phe Leu
1650 1655 1660
Lys Asp Met Asp Gln Phe Asp Pro Leu Phe Phe Asn Leu Ser Gly Val
1665 1670 1675 1680
Glu Ala Ser Tyr Met Asp Pro Gln Gln Arg Cys Phe Leu Glu Glu Ser
1685 1690 1695
Trp Asn Ala Leu Glu Asn Ala Gly Tyr Val Gly Asp Gly Ile Glu Gly
1700 1705 1710
Lys Arg Cys Gly Ile Tyr Ala Gly Cys Val Ser Gly Asp Tyr Ala Gln
1715 1720 1725
Leu Leu Gly Asp Gln Pro Pro Pro Gln Ala Phe Trp Gly Asn Ala Ser
1730 1735 1740
Ser Ile Ile Pro Ala Arg Ile Ala Tyr Tyr Leu Asn Leu Gln Gly Pro
1745 1750 1755 1760
Ala Thr Ala Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Val His
1765 1770 1775
Leu Ala Cys Gln Ala Leu His Leu Asp Glu Met Glu Met Ala Leu Ala
1780 1785 1790
Gly Gly Val Ser Leu Tyr Pro Thr Pro Ile Ile Val Glx Val Phe Ala
1795 1800 1805
Trp Cys Arg Tyr
1810